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Gill at the Cape observatory, and it is hoped that Dr. Elkin will employ it in continuing these remarkable measures. We believe that no method of determining stellar parallax, so accurate and expeditious as this, has ever before been at the command of astronomers.

SIMON NEWCOMB.

CARNIVOROUS HABITS OF THE MUSKRAT.

AT a recent meeting of the Biological society of Washington, a paper was read by Mr. Henry W. Elliott, setting forth an entirely new fact in regard to the diet of the common muskrat (*Fiber zibethicus*), proving that carp-ponds in the west are being completely devastated by this animal. Ponds which should produce many carp are almost entirely barren; and for a long time the owners have been unable to account for it, no hawks being seen, there being no possibility of escape from the ponds, and in some it being impossible for other people to take them with a seine on account of obstructions placed in the way to prevent this. It was finally suggested, and afterwards proved conclusively, that muskrats were the miscreants. Carp have the stupid habit of sticking their noses into the mud during the winter, and hibernating; thus rendering it possible for so clumsy an animal as a muskrat to obtain them easily,—a thing which it would probably do in winter, when roots, etc., its natural food, are hard to obtain. If it be a fact that the muskrat has acquired the habit of eating carp, immense damages are likely to result, unless speedy and extreme measures be taken; for, under these circumstances, such a sluggish and poorly protected fish as the carp can hardly be expected to resist or avoid its enemy, but will become its easy prey: and thus one of the most important works of the fish-commission, from which such great economic benefits were expected, will result in nothing. As a means of getting rid of these pests, so hard to shoot, and not easily trapped, poisoning by means of strychnine placed in apples was suggested as the best, it having been applied with success in many cases. In his communication, Mr. Elliott asserted that in no monograph of the animal could he find any mention of the diet of the muskrat, other than that it was an exclusive vegetarian, and, so far as he could ascertain, this was the first time that the carnivorous appetite had ever been brought before scientific men; in which statement he was sustained by an authority upon mammals, present at the meeting. This was surprising to many; for it seems to be well known, as was proved by the discussion which followed the paper, that the muskrat will, and does frequently, under favorable conditions, eat animal food. One gentleman mentioned that he had seen muskrats take bait, and even live fish, from his hook, while fishing in fresh water. The piles of *Unio* shells frequently seen upon the tops of muskrat mounds, also prove conclusively that it will at times eat animal food. It is noticed that the shells are always perfect, not even having chipped edges; and it would seem strange that this should be so, unless we supposed that they

were left to die before being eaten; the meat then being easily picked out.

The muskrat is not the only rodent which departs occasionally from a vegetable diet; for such animals as the squirrel and capybara are, and have been for a long time, known to eat flesh when the circumstances are favorable. Mice and rats, of course, are well known to be omnivorous, eating animal food as quickly as vegetable, this being the partial result of contact with man. In the other orders of herbivorous mammals, examples of deviations from the normal class of food are frequent, especially under domestication: for example, the feeding of fish to cattle; while, under similar conditions, the carnivorous dog and cat can be made to eat vegetables or vegetable products. By thus adding one more animal to the number of recorded species which will adopt an opposite diet from the natural, Mr. Elliott is deserving of credit; for, notwithstanding the fact that it is known to some, still it has never been placed before the scientific world in any recognized monograph or treatise upon Rodentia.

RALPH S. TARR.

CONDITIONS OF GROWTH OF THE WHEAT-RUST.

THE last part of the journal of the Royal agricultural society of England has sixty pages devoted to a 'Report on wheat-mildew.' Mr. W. C. Little prepared an extended list of questions concerning the wheat-mildew, or wheat-rust (*Puccinia graminis*), to which a large number of answers were received from British farmers who had suffered from the rust. From these reports it is gathered, that the rust is more prevalent in those localities where the atmosphere is most moist. Spring frosts, heavy rainfalls, and violent changes of temperature, encourage rust. Hot weather, with frequent thunder-storms, is most favorable for the rapid development of the fungus parasite. Some of the observations point toward the belief that about eleven days are required for the full development of the *Puccinia* after it has entered the wheat-plant.

Perhaps the most valuable results of the compiled answers are those upon the relation of soils to the rust. The pest is more prevalent on peat and clay soils than on gravel or light lands. Drainage is a partial preventive of rust. High farming encourages the development of rust, especially if the wheat is rank, and it becomes lodged or fallen. There is an agreement of opinion that rust prevails in wheat sown after clover. Newly broken up lowland pastures are seldom sown to wheat because so sure to become rusted.

Dr. J. B. Lawes holds the view that plants are liable to the attacks of parasites, either insects or fungi, in proportion as the soil is deficient in available mineral food. Common tilled land contains about ninety-seven per cent of mineral matter, and three per cent of vegetable substance. The lowlands have this proportion nearly reversed. Dr. Lawes says, "Plants are very much like ourselves: their power to escape disease, and to struggle against

it when attacked, depends very much upon their state of health." Dr. Voelcker, the chemist of the Royal society, has said, "I believe the soil has a great deal to do with mildew. An excess of available nitrogenous food appears to me to have a decided tendency to cause mildew in wheat. A clover-crop leaves a large amount of nitrogenous matter in a soil, and renders wheat following it liable to attacks of rust." Dr. Voelcker further agrees with Dr. Lawes when he says, in answer to Mr. Little's letter, "A sudden check by cold or continued wet weather has a decided tendency to favor the attacks of mildew in wheat; and this tendency is greater in highly manured land than in poor soil, or, at all events, on land which is manured with too much nitrogenous food, or on land naturally rich in such food." Four widely different soils upon which wheat had been grown were analyzed by Dr. Voelcker, and it was found that the amount of mildew determined by extended observations varied directly with the per cent of nitrogenous matter in the soil. But much depends on previous cropping, and therefore the ratio between mildew and nitrogenous matter in the soil may vary to a limited extent.

The large amount of evidence gathered, and presented in extended tables, shows that some sorts are more capable than others of resisting rust, though no varieties are rust-proof. White wheats suffer more than red sorts. It is best to sow early maturing varieties, and sow them early.

BYRON D. HALSTED.

New York.

THE CODEX CORTESIANUS.

Codex Cortesianus, manuscrit hiératique des anciens indiens de l'Amérique Centrale conservé du Musée archéologique de Madrid photographié et publié pour la première fois avec une introduction et une vocabulaire de l'écriture hiératique Yucatéque. Par LÉON DE ROSNY. Paris, Maisonneuve, 1883. 26 + 49 p., 42 pl. 4°.

THIS volume by Léon de Rosny is undoubtedly the most important contribution to Central-American paleography which has appeared since the publication of Landa's 'Relacion,' and the 'Manuscrit Troano' by Brasseur de Bourbourg. In it we have a photo-engraved reproduction of the recently found aboriginal manuscript known as the 'Codex Cortesianus,' thus adding one more to the brief list of pre-Columbian Maya documents which have so far been discovered. The name 'Cortesian' has been applied to it because of the supposition that it had once belonged to Hernando Cortez.

Up to 1876 but three of these manuscripts — the 'Dresden codex,' the 'Codex Troano,' and the 'Codex Peresianus' (or 'Manuscrit mexicain No. 2') — had been brought before the public. About this time a proposition was made to the Bibliothèque impériale of Paris by some one in Spain (the name is not given)

to sell to it an ancient American manuscript. A photographic copy of two pages accompanied the proposition as specimens of the volume. On account of the high price demanded, the proposition was not accepted. Shortly afterwards it was obtained by the Spanish government, and deposited in the archeological museum at Madrid. One of these two pages was copied by Mr. Rosny in plate 11 of his "*Essai sur le déchiffrement de l'écriture hiératique de l'Amérique Centrale;*" and the other, which is beyond question a missing half of the initial page of the 'Codex Troano,' in plate 5 of his "*Documents écrits de l'antiquité américaine.*"

In 1880 Mr. Rosny went to Madrid expressly to see and study this codex, and, if possible, to obtain a copy of it. Through the kindness of Don Juan de Dios de la Rada, the curator of the museum; his mission was eminently successful, as he was permitted, not only to examine it, but to make two complete photographic copies of it. It was from these, I presume, that the plates of the present work were made.

We learn from the introduction, that the original, like the other three Maya manuscripts, is written on both sides of a strip (probably of Maguey paper) covered with a coat of white paint. Judging by the specimen given in Mr. Rosny's '*Essai sur le déchiffrement,*' plate 11, I presume the figures are partially colored, though not so highly nor to the same extent as in the Troano manuscript; but unfortunately this is not shown in the present work.

The general appearance, the figures, the form of the characters, and numerous other particulars, prove very clearly that it is more closely related to the Troano manuscript than to any other one of the Central-American codices. This is so apparent, that Mr. Rosny has suggested that the two are parts of one original work. The fact that we find here the missing half (by this we know that one-half is missing) of the 'titlepage' of the Troano manuscript is a very strong argument in favor of this view. Still, I am disposed to doubt its correctness, for the following reasons: 1°. On plates 39 and 40, upper division, we find an exact repetition of the five figures in the top division of plates 29 and 30 of the Troano manuscript; 2°. In the plates of the latter half, quite a number of numerals are introduced into the text, and joined to characters to which they are never attached in the manuscript; 3°. The form of the serpent-figures (no one can fail to remark the strong resemblance between the heads of some of these serpent-figures and the dragon-